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ABSTRACT

A modified three-step Delphi procedure was used to conduct a series of national studies of futurists regarded by their peers as top experts in agricultural education. The primary objective was to project enrollments in agricultural education programs for the 21st century. Other study objectives were to ascertain whether the Delphi technique could achieve consensus among recognized futurists as to the profile of agriculture and agricultural education in the next century and to determine the effects of demography on item ratings. Data collection instruments were prepared following a literature review, field tested by a group of agriculturalists and researchers, revised, and mailed to 20- to 35-member panels of experts for first-round evaluation. A five-point Likert-type scale was used to elicit responses. Panel responses were summarized and returned for second-round responses. In most cases, data collection was concluded within 3 months with 85-100 percent response rates and hundreds of comments. The modified Delphi procedure was deemed effective in securing consensus from industry experts in the fields of nursery/landscaping, meats, forestry, broiler production, dairy production, and greenhouse operations. Two rounds were sufficient to secure convergence of opinion and stability of response. Demographic differences had little effect on item ratings or response levels. (MN)

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Projecting Agricultural Education Programs for the 21st Century Using a Modified Delphi Technique

Theoretical framework

If students are to enter society in the future, educational programs should be futuristic in design. In vocational education, job analysis has been commonly used to develop curriculum and programs. Given the lag between program development and student completion, graduates are placed at a disadvantage because they studied curricula that was based on the past or, at best, the fleeting present. Needed was a way to focus the program on the future rather than the past.

The Delphi technique is an appropriate research design for determining long-term trends. First developed by the US Air Force to assess defense capabilities, the Delphi has subsequently become a common method of futures research (Uhl, 1983). Linstone and Turoff (1975) identified seven conditions under which the Delphi may be employed:

1. The problem does not lend itself to precise analytical techniques but can benefit from subjective judgments on a collective basis.

2. The individuals needed to contribute to the examination of a broad or complex problem have no history of adequate communication and may represent diverse backgrounds with respect to experience and expertise.

3. More individuals are needed than can effectively interact in a face-to-face exchange.

4. Time and cost make frequent group meetings infeasible.

5. The efficiency of face-to-face meetings can be increased by a supplemental group communication process.

6. Disagreements among individuals are so severe or politically unpalatable that the communication process must be refereed and/or anonymity assured.

7. The heterogeneity of the participants must be preserved to assure validity of the results, i.e. avoidance of personality or "bandwagon" effect. (p. 4)

Many of these conditions were present in the agricultural industries studied. By combining the results of Delphi studies with task analyses, the researchers proposed a solution to the time lag between vocational program development and student job placement. Another problem was the lack of futuristic research in agindustry. Although the agricultural sector has a long and illustrious history in research and development, surprisingly little has been done to project industry characteristics into the next century. Most of the futuristic projections that were found were in the popular press or in conference papers, and much of that was limited to three to five years into the future.

Objectives

The primary purpose of the research was to determine program direction in agricultural education for the 21st century. Specific objectives were to: a) determine future characteristics of various specialties in the agricultural industry;

b) ascertain if the Delphi technique could achieve consensus among recognized futurists in the specialization as to the profile of the industry in the next century; c) assess whether demographic differences among respondents affected item ratings; and d) extrapolate from findings to project future emphasis in the instructional program.

Methods/Data Source

A series of national studies have been conducted using a modified, three-step Delphi procedure (Flanders, 1988; Varnadore, 1989; Kaylor, 1990; Collins, 1991; Embrick, 1991; McAllister, 1992). A panel of futurists regarded as the top experts in their field were peer nominated through the leading professional organizations and state agencies or university departments concerned. The researchers prepared data-gathering instruments from the literature and subjected the results to a field-test group of educators, agriculturalists and researchers. Subsequently, the revised 50-100 item instruments were mailed to the 20-35 member panels of experts for first-round evaluation. A five-point, Likert-type scale was used to elicit responses. Room was provided after each futuristic statement for respondent comments. Panel responses were summarized for each item, along with any comments, and sent back for second-round response and statements. Data collection was concluded within three months, in most cases.

Data were analyzed using primarily descriptive statistics, including: means, standard deviations, medians, and interquartile ranges. The Pearson product-moment correlation

coefficient was used to measure stability between rounds. A composite score was calculated for each item by adding the Likert scale score for all respondents. Consensus was reached on an item if 60% of the respondents were in agreement and the answer fell within either the agree or disagree range. The researchers used logic to extrapolate findings into program projections.

Results

A very high rate of return (85 to 100%) and hundreds of comments gave high credibility to the studies. Consensus was reached on between 50 and 75% of the items, on the average. It was thus possible for the researchers to establish a composite picture of their respective fields for the future, based on the item ratings from the expert panels. Twenty to thirty projections were made from the findings in each study.

The modified Delphi was found to be effective in securing consensus from industry experts in the fields of nursery/landscaping, meats, forestry, broiler production, dairy production and greenhouse operations. Two rounds were sufficient to secure convergence of opinion and stability of response. Demographic differences had little effect on item ratings or response levels.

Numerous programmatic recommendations were made, along with suggestions for replication and expansion of the research. Studies are being initiated in other areas of the agricultural field, and efforts are being made for qualitative analyses of the voluminous panel comments. Extensive dissemination steps are underway.

Importance

This research constitutes valuable baseline data for program development in agricultural education. Each study in different specialized areas of agricultural industry helps to form "building blocks" in the foundation for a futuristic program. Curriculum developers, state supervisory personnel and teacher educators all benefit from this new knowledge in the field of agricultural education. Likewise, personnel at all educational levels -- elementary and secondary schools, the post-secondary and four-year colleges and universities -- can gain valuable perspectives from this research.

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